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The Flames of Hope

A Berkeley physicist has found a way to help keep Darfurians alive, by building a better kitchen stove.

By Barrett Sheridan
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July 16, 2007 issue - As for so many of us, the genocide in Darfur was merely an abstraction to Ashok Gadgil, a scientist at the Lawrence Berkeley National Laboratory in California. But in September 2004 he got a call from the U.S. Agency for International Development. Could Gadgil design a screw press for Darfurians, the caller asked, so they could turn their garbage into biofuel pellets? "I quickly showed him that there is not enough kitchen waste in home cooking to produce much worthwhile fuel," the physicist says, and USAID dropped the idea. But the problem continued to nag at him. Eventually Gadgil decided that if he couldn't redesign the fuel, he would redesign the stove.

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Fuel For Thought: Using the stove on site

The violence in Darfur has not only left at least 200,000 dead but devastated the already arid landscape. More than 2 million people now fill groaning refugee camps; as they hunt farther and wider for firewood, they are denuding whole swaths of the countryside. Gathering firewood can now mean a seven-hour round trip, during which women risk rape and mutilation at the hands of the Janjaweed militias that lurk in wait. (Men can't make the trip in their stead—they'll simply be killed.) A fact-finding visit to the region in late 2005 brought home the problem's urgency to Gadgil. "A huge majority of people were missing at least one meal a week because they did not have fuel to cook with," he says. In a sick Catch-22,

many families were selling some of their food in exchange for the wood to cook it with.

Gadgil, a 56-year-old Mumbai native, had experience developing simple, life-saving technology. One of his patents—a cheap method for disinfecting water using ultraviolet light—led to a successful business start-up in 1996. The resulting company, WaterHealth International, now provides affordable clean water for more than 1 million people in the developing world. After returning from Darfur, Gadgil worked with lab colleagues and students at UC Berkeley to modify an existing Indian stove for Darfurians' needs. "Cook stoves, although they look simple, are very complex creatures," he says, "which is why you can't simply sit in Berkeley and say, 'Well, this is the stove for you'." While the Indian stove excelled at producing low-intensity heat for cooking rice, for instance, Darfurians needed a high-powered flame for sautéing onions, garlic and okra, ingredients in their staple dish, mulah. And since most families cook outside, the stove also needed to cope with the region's strong winds.

Robyn Twomey for Newsweek

Science of Stoves: Berkeley science professor Dr. Ashok Gadgil holding the stove he designed for the Darfur stove project

The result of their efforts is the Berkeley-Darfur stove (darfurstoves.org), a hollow drum that looks like a cross between a lunar landing craft and a stop sign. Designed with a smooth airflow to fuel the fire and an upper rim that fits snugly with different-size pots, the stove requires 75 percent less wood than an open fire, and a wind collar makes for a steady flame. That means fewer risky trips outside the camp. And those who now pay for firewood, Gadgil estimates, could save as much as $200 a year, which could be used instead for luxuries like new clothing and fresh meat.

The next step is mass production. Gadgil and his partners in Berkeley have teamed with two nonprofits, Engineers Without Borders and CHF International, to set up workshops in Sudan. (The project is funded by USAID and individual donors.) They hope ultimately to distribute stoves to nearly all 300,000 refugee families. Brian Tachibana, a volunteer with EWB, ran into resistance when he first visited Khartoum last September to find manufacturers. Presented with a gleaming prototype that had been made in Berkeley, local craftsmen declared firmly, "There's no way you can build this in Sudan." Tachibana needed to tweak the

production method—substituting hand shears for high-pressure water jets, for example—to arrive at a workable, low-tech solution.

Gadgil and EWB have yet to settle on a distribution plan. They won't be handing the stoves out as charity—"Giving something away turns the recipients into beggars," Gadgil says—but at $25 apiece, the devices are out of the reach of most families. Gadgil favors some sort of leasing plan, allowing families to rent the stove for about 50 cents a week. The ultimate goal is for the refugees to take over the program, from manufacturing to distribution, which would mean jobs and income. Gadgil's team has already donated a range of scientific equipment, including electronic scales and anemometers to measure wind speed, in order to monitor the existing stoves and test the efficiency of alternatives. "We don't want to claim that this is the final word," Gadgil says. "If somebody comes along tomorrow or next year and says we've got a better stove, all success to them. We're trying to solve a problem here."